Claims

1. A method for describing adaptive mobile multimedia applications and/or presentations, whose playback behavior inherently depends on the current situation at runtime, the method being based on an XML-based document model (100) and comprising the step of

- describing the intrinsic adaptation possibilities of application and/or presentations, which run in a mobile network environment, in an Adaptation Module (109) comprising the vocabulary and language structure required for describing the adaptation possibilities of said adaptive mobile applications.

2. A method according to claim 1, furthermore comprising the step of

- describing the available media for the application and/or presentation in a MediaItems Module (108) comprising the vocabulary and language structure required for describing the media items (304) used within said adaptive mobile applications.

3. A method according to anyone of the preceding claims, furthermore comprising the step of

- describing the interaction parameters of the application/presentation in an Interactions Module (110) comprising the vocabulary and language structure required for describing the interaction possibilities (404) used for said adaptive mobile applications.

4. A method according anyone of the preceding claims, furthermore comprising the step of

- describing the constraints of the adaptation process in a Constraints Module (116) comprising the vocabulary and language structure required for describing constraints (802) for said adaptive mobile application.

5. A method according anyone of the preceding claims, furthermore comprising the step of

changing the language structure and vocabulary of the modules (106, 108, 109, 110, 116) in an Events Module (118) comprising the vocabulary and language structure required for describing the event possibilities used in said mobile applications.

6. A method according to anyone of the preceding claims,
furthermore comprising the step of
- describing the association between the Adaptation Module (109) and the MediaItems Module (108), represented by a link.

7. A method according to anyone of the preceding claims,
furthermore comprising the step of
- describing the association between the Adaptation Module (109) and the Interactions Module (110), represented by a link.

8. A method for describing a XML-based document serving as a connection layer between a middleware framework supporting mobile adaptive multimedia applications and an authoring system supporting the generation of mobile adaptive multimedia applications (structure and vocabulary) as described in anyone of the claims 1 to 9,
characterized in that the description is carried out by means of a language comprising:

- at least one MediaItems Module (108) serving as a description unit for available media items (304) within said multimedia applications,
- at least one Layout Module (106) which organizes said media items into regions (502) on the visual rendering surface of a mobile display device, and
- at least one Adaptation Module (109) which controls a context-aware adaptation of said distributed multimedia applications by referencing elements of the MediaItems Module (108).

9. A method according to claim 8,
wherein the language furthermore comprises:

- at least one Constraints Module (116) which allows adding additional constraints (802) to the adaptation description elements (2900), and
- at least one Events Module (118) which allows to react on changes of various resources

encompassing user's physical environment (location, temperature), user's context, quality-of-service (QoS) conditions of the applied networks, and mobile device capabilities.

10. A method for operating a middleware framework supporting the processing of an XML-based description of an adaptive mobile application/presentation (100) according to anyone of the claims 8 and 9,
characterized in that
said middleware framework allows each running mobile multimedia application to specify the media it wants to use and the relationships between these media, calculates the adaptation possibilities (1500) of mobile multimedia applications and controls the adaptation process in dependent on the current situation.

11. A method according to claim 10,
characterized by
the step of modifying the linking structure between the Adaptation Module (109) and the MediaItems Module (108) in case the current situation has changed.

12. A method according to claim 10,
characterized by
the step of modifying the linking structure between the MediaItems Module (108) and the Layout Module (106) in case the current situation has changed.

13. A method according to claims 10,
characterized by
of modifying the linking structure between the Interactions Module (110) and the Layout Module (106) in case the current situation has changed.

14. A method according to claims 10,
characterized in that
the document linking structure and/or the document structure and document vocabulary itself are modified by user interactions (404).

15. A method according to claim 14,
characterized in that
user interactions (404), which are used to modify the document linking structure and the document itself, are described by the Interactions Module (110).

16. A method according to anyone of the claims 10 to 13,
characterized by
dynamically binding media items (304) to a specific region (502) on the visual rendering surface of the mobile display device with the aid of the Events Module (118), initiated by changes (3700) of the current situation.

17. A method according to anyone of the claims 11 to 14,
characterized by
dynamically binding widgets (404) to a specific region on the visual rendering surface of the mobile display device with the aid of the Events Module (118), initiated by changes (3700) of the current situation.

18. A method according to anyone of claims 8 and 9,
characterized by
the step of an extending or newly specifying at least one attribute of at least one element of the Layout Module (106) in order to adapt the visual component (600) of a specific media item (304) to the dimension of those regions (502) on the applied mobile display device which are intended for multimedia presentations by scaling scaling-up /scaling-down the visual size of said media item (304) or replacing the said media item (304) dependent on the current situation.

19. A method according to anyone of claims 8 and 9,
characterized by
describing (700) alternative media items (304) of the MediaItems Module (108) used in the Adaptation Module (109) by means of
- media-specific information encompassing bandwidth and size of the visual portion of a multimedia presentation,

- meta information encompassing the name, the genre, and the actor of the media in case of a media item (304) of type video, and/or
- inline information or a reference to external resources by the usage of Universal Resource Identifiers (URIs).

20. A method according to anyone of claims 8, 9, 10 and 19,
comprising the step of
specifying various alternatives both at start-up time and in case of changes of the current situation by means of a choose" element (704) of the Adaptation module (109).

21. A method according to claim 20,
characterized by the steps of
- selecting the most appropriate adaptation possibility (1500) at start-up time,
- continuously monitoring the network conditions, the available mobile device capabilities and/or the user context, and
- selecting the most appropriate adaptation possibility (1500) in case of changing network conditions, mobile device capabilities and/or user context.

22. A method according to claim 21,
characterized by the step of
influencing the adaptation control process by the usage of priority attributes supported by the respective elements of the Adaptation Module (109).

23. A method according to claim 22,
comprising the step of
using a Par Element (702) of the Adaptation Module (109) for defining a simple time grouping in which multiple elements must be played back at the same time.

24. A method according to claim 23,
characterized in that
the adaptation possibilities (1500) are calculated with the aid of a Boolean term expressed by a Disjunctive Normal Form (DNF) on a set of different media items (304), wherein a

"choose" element (704) is considered as an "OR" operator and a "par" element (702) as an "AND" operator, from which one conjunction of the Disjunctive Normal Form (DNF), the adaptation possibility (1500), is selected, depending on the quality-of-service (QoS) of the applied networks, the mobile device capabilities and the user context.

25. A method according to claim 24,
characterized by the step of
using an "Adaptation Description Module" (2900) which provides the "choose" element (704) with a "startmode" attribute for modifying its default behavior, which specifies at which playtime a specific media, especially continuous media, is started after an adaptation has been executed due the change of the current situation.

26. A method according to claim 25,
characterized in that
the continuous media item (304) is replaced by a different continuous media item (304) due to the change of the current situation, and the new one is simply started according to a media item's "startmode" attribute.

27. A method according to claim 26,
characterized in that
the "startmode" attribute can take one of the following values:

- a "restart" value, which indicates that the media item (304) should always start from the beginning,
- a "resume" default value, which indicates that the media items (304) should always start from the position it stopped,
- a "laststop" value, which indicates that the media item (304) should always start at the media time the last continuous media item (304) contained in the same "choose" element (704) stopped,
- a "playtime" value, which indicates that the media item (304) should always start at the time, which is the combined playtime of all media items (304) contained in the "choose" element (704) since the "choose" element (704) is started, and
- a "contplaytime" value, which indicates that the media item (304) should always start at

the time, which is the combined playtime of all continuous media items (304) contained in the "choose" element (704) since the "choose" element (704) is started.

28. A method according to claim 27,
characterized in that
the "Adaptation Description Module" (2900) supplies the "choose" element (704) with an "onremove" attribute specifying what happens after a continuous media item (304) is played back.

29. An method according to claim 28,
characterized in that
the "Adaptation Description Module" (2900) provides the "choose" element (704) with an "evaluation" attribute which specifies if the content model of the element "choose" (704) is evaluated once at start-up time, repeatedly in a specific time period or continuously while playing back the multimedia presentation.

30. A method according to anyone of the claims 28 and 29,
characterized in that
the "Adaptation Description Module" (2900) provides the "choose" element (704) with an "empty" attribute which supports the functionality that the set of media appropriate for specific current situation can be empty.

31. A method according to claim 30,
characterized in that
the evaluation of the associated priority (1400) of an adaptation possibility (1500) is done by

- sorting all children of a par element according to their priority (1400),
- merging the configurations of the first two child elements by means of an "AND" operator in such a way that the priority (1400) of the resulting configurations consist of the priority (1400) of the higher prioritized child appended with the priority (1400) of the lower-prioritized child, and

repeatedly merging the result with all other children of the par element.